A NEW GENUS AND SPECIES OF EARTHWORM (MEGASCOLECIDAE: OLIGOCHAETA) FROM SOUTH AUSTRALIA

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Summary

EDMONDS, S. J. and JAMIESON, B. G. M., A New Genus and Species of Earthworm (Megascolecidae: Oligochaeta) from South Australia. *Trans. R. Soc. S. Aust.*, 97 (1), 23–27, 28th February, 1973.

The genus *Gemascolex* is erected for the new species *G. newmani*, from South Australia. The genus is morphologically very similar to *Spenceriella* Michaelsen, differing primarily in lacking the extramural calciferous glands of the latter genus. Both genera are assigned to the tribe Megascolecini. *G. newmani* is the fourth megascolecid species described from South Australia, but of those previously described, *Megascolex fletcheri* Shannon is considered to be a junior synonym of *M. stirlingi* (Fletcher), leaving the total number of described South Australian megascolecid species at three.

Introduction

Three species of Megascolecidae, the only earthworm family indigenous in Australia, have previously been named from South Australia. They are *Megascolex stirlingi* (Fletcher, 1888), placed in *Perichaeta* by Fletcher; *M. zietzi* Michaelsen, 1907a; and *M. fletcheri* Shannon, 1920. *M. fletcheri* Shannon is a homonym, the binomen having been used by Michaelsen, 1907a, for a distinct species from New South Wales. Shannon's account, though long, is inadequate in many respects and the type-specimens are no longer traceable. It nevertheless conforms sufficiently with the description of *M. stirlingi* to suggest, though not unequivocally, that *M. fletcheri* Shannon is a junior synonym of *M. stirlingi*. The latter species has been rediscovered by both authors in recent collecting in South Australia and will be described in a future monograph (Jamieson, in preparation) in which the status of *M. zietzi* will also be considered.

The new species erected here has been used for some years for undergraduate teaching and for research in the Department of Zoology of the University of Adelaide. It is referred to a new genus which is defined below. Evidence for including *Megascolex stirlingi* (Fletcher) and other species in the new genus will be deferred to the later publication.

GEMASCOLEX gen. nov.

Terrestrial. Setae numerous (more than 8) in each segment. A pair of combined male and prostatic pores on XVIII. Clitellum annular, anterior to 18/19. Intersegmental accessory genital markings present. Female pore unpaired, midventral, in XIV. Spermathecal pores anterior to IX.

Dorsal blood vessel single. Posterior hearts latero-oesophageal, each arising from the short supra-oesophageal vessel and from the dorsal blood vessel. Latero-oesophageal vessels present median to the hearts. Subneural vessel absent. Gizzard large, anterior to septum 6/7. Oesophagus lacking extramural calciferous glands. Intestine commencing in XVII; a low ridge-like dorsal typhlosole present; caeca and muscular thickening absent. Excretory system meronephric. Four pairs of tufted nephridia, in II–V, their ducts (all?) enteronephric, entering the buccal cavity. Succeeding segments with astomate, exonephric, micrometronephridia in lateral bands. Caudally with numerous enteronephric meronephridia, each with a pre-

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septal funnel, discharging into the intestine in each segment. Testes and funnels in X and XI; testis-sacs absent; seminal vesicles in XI and XII.

Ovaries and funnels in XIII; ovisacs absent. Prostates tubuloracemose: linear, lobulated, with axial lumen throughout which receives lateral canaliculi; vasa deferentia joining their muscular ducts. Spermathecae with diverticula. (*Gemascolex*, gender male, anagram of *Megascolex*).

Type species: Gemascolex newmani sp. nov.
Distribution: South Australia (see species description).

Remarks: The closest morphological affinities of *Gemascolex* lie with two endemic Australian genera, *Spenceriella* Michaelsen, 1907b, and *Oreoscolex* Jamieson, 1973. The three genera are the only members of the indigenous Australian Megascolecidae known to possess more than one pair of stomate nephridia per segment, and are assignable to the tribe Megascolecini Jamieson, 1970. *Spenceriella* and *Gemascolex* are especially close, as in both, some at least of the caudal nephridia are enteronephric, opening into the intestine, whereas in *Oreoscolex* caudal enteronephry has been deduced only very questionably in the type-species and is unknown in other species. Multiple nephrostomes and enteronephry have been demonstrated in *Spenceriella* for the first time by Jamieson (in preparation). *Oreoscolex* further differs from *Gemascolex* and *Spenceriella*, among other respects, in having only eight setae per segment.

The chief distinction between *Gemascolex* and *Spenceriella* is the presence of extramural calciferous glands in *Spenceriella*. Both genera differ from the type-species of *Megascolex* in having stomate nephridia and in their enteronephry (Bahl 1946). Only the non-racemose condition to the prostates would have separated them from Megascolex in some former classifications.

Gemascolex newmani sp. nov.

FIG. 1

The following account refers to the holotype (H) and one paratype (P1); variation in other specimens is discussed subsequently.

Length 180(P1)–234(H) mm, width (mid-clitellar) 9 mm, number of segments 192(H); 193(P1). Colour in life: dorsal surface brownish purple, ventral surface pale grey; a dark purplish colour more noticeable at the extremities; some iridescence present. Cross section approximately circular. Prostomium epilobous 1/3, bisected by a longitudinal furrow, appearing epitanylobous, owing to longitudinal grooves continuing its lateral limits to the first intersegmental furrow, but numerous equally developed parallel grooves present around the peristomium. Peristomium not bisected ventrally though in some specimens a mid ventral groove is more conspicuous than others. First dorsal pore 4/5. Perichaetine, setae of each side more closely spaced laterally than dorsally and ventrally; *bc* slightly wider than *ab*. Numbers of setae per segment 32(H)–33(P1) in XII, 26(P1)–30(H) in XX, 31(P1)–32(H) fifteen segments from the caudal end: *a* lines straight, *z* lines irregular; a ventral and a dorsal break in the setal circlet appreciable throughout. Setas *a* and *b*, but not *c*, absent in XVIII.

INTERSETAL DISTANCES IN *Gemascolex newmani*

	mm					standardized as % of circumference (u)			
	aa	ab	zy	zz	u	aa	ab	zy	zz
Segment XII									
Holotype	2.2	0.8	0.9	6.2	28	7.9	2.9	3.2	22.1
Paratype 1	2.3	0.8	1.0	6.3	28	8.2	2.9	3.6	22.5
Segment XX									
Holotype	1.8	0.6	0.9	5.6	30	6.0	2.0	3.0	18.7
Paratype 1	2.1	0.6	1.3	4.9	27	7.8	2.2	4.8	18.1

Nephropores not externally recognizable. Clitellum annular, not fully developed, embracing XIV–XVII, but some clitellar modification present dorsally from 2/3 XIII–XVIII (=5 1/3 segments); intersegments and setae retained but only *a* and *b* conspicuous; dorsal pores 13/14–17/18 occluded. Male pores a pair in XVIII, transverse slits in *ab*(H) or *b*(P1) and almost as wide as *ab*, each on a low transversely oval papilla, the two papillae outlined by a common medianly narrowing field; the pores 2.8–3.2 mm, 0.08–0.09 circumference apart. Accessory genital markings unpaired, midventral, transverse, elevated pads, with lateral limits in *ab*, in 15/16(H, P1), 16/16 and 19/20(H), each pad transversed by a glandular trench corresponding with the intersegmental furrow but not reaching to the ends of the pad. Female pore unpaired, midventral, in a deep transverse groove at the anterior border of the setal annulus of XIV. Spermathecal pores 3 pairs of sunken orifices, concealed in intersegments 6/7, 7/8 and 8/9, very shortly lateral of setal lines *a*, 2.8–2.9 mm, 0.09 circumference apart.

Strongest septa 10/11–12/13, very strong. Dorsal blood vessel single, continuous onto the pharynx. Dorsoventral commissural vessels

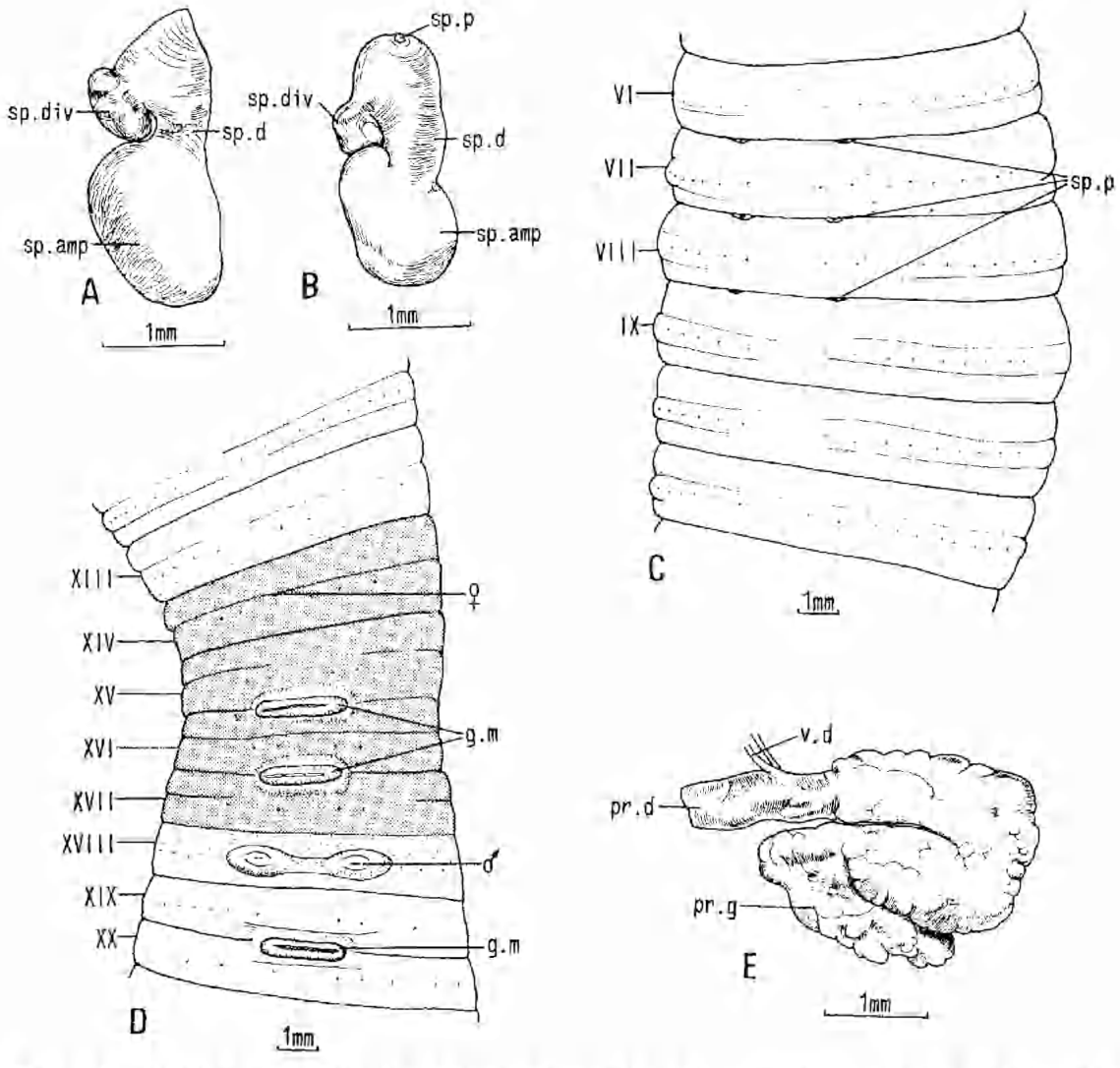

Fig. 1. *Gemascolex newmani* sp. nov. *A*, ventral view of right spermatheca of IX (holotype); *B*, dorsal view of right spermatheca of IX (paratype 2); *C*, spermathecal pores (holotype); *D*, male genital field (holotype); *E*, right prostate (paratype 2). Clitellum shaded. All by camera lucida. ♀, female pore; g.m, accessory genital marking; ♂, male pore; pr.d, prostate duct; pr.g, glandular portion of prostate; sp.amp, spermathecal ampulla; sp.d, spermathecal duct; sp.div, spermathecal diverticulum; sp.p, spermathecal pore. Roman numerals are segment numbers.

in V–XIII; those in X–XIII forming large latero-oesophageal hearts, each originating from the supra-oesophageal vessel but also receiving, at its junction with the latter, a slender short connective from the dorsal blood vessel; these hearts otherwise unbranched. Commissurals in V–IX dorso-ventral only, lacking supra-oesophageal connectives, but giving branches to the posterior septum, gut and lateral parietes; all commissurals, including the hearts, valvular. A pair of large vessels originating on the parietes in IV passes posteriorly as a pair of large ventrolateral trunks (latero-oesophageal vessels), median to the dorsoventral commissurals, into IX at the posterior septum of which they give branches to the ventral wall of the oesophagus and to the septum. Similar paired trunks (suboesophageal vessels) present in XI–XVI, closely adherent to the ventral surface of the oesophagus and lying under its peritoneum; no continuity demonstrable between the latero-oesophageal vessels in IX an-

teriorly and the suboesophageal vessels in XI posteriorly; both pairs of vessels give a pair of vessels to the oesophageal plexus in each segment. Submedian vessel absent. Gizzard moderately large, fusiform, and firmly muscular in VI; septum 5/6 adherent to its anterior end; its posterior end projecting a little behind intersegment 7/8; the oesophagus much narrower in V, short and narrow in VII; dilated and vascularized with low internal rugae, but no calciferous glands, in VIII–XV, narrow and short in XVI. Intestinal origin XVII; a low ridgelike dorsal typhlosole commencing in XXIII; caeca and muscular thickening absent. Nephridia: meronephric; large paired tufts, with very many spiral loops, in II, III, IV and V increasing in size posteriad and very large in V. Those in V and IV sending anteromedianly thick sheaves of numerous ducts, which loosely aggregate as a composite duct common to both pairs of tufts, the ducts passing forward to join the lateral wall of the buccal cavity in front of the brain. Those in III and II sending slender composite ducts to the lateral walls of the buccal cavity immediately behind the mouth. Nephridia in succeeding segments astomate, exonephric, micromeronephridia: very dense transverse bands of spiral tubules, which laterally may be considered to form tufts, anterior in VI, their numerous discrete or partly aggregated ducts discharging exonephrically at the anterior limit of the segment; some exonephric nephridia present posteriorly in the segment; VII-X each with an anterior and a posterior parietal band of numerous nephridia; XI, XII and XIII with similar but rather sparse bands; XIV with sparse anterior and dense posterior bands; XV with denser anterior and sparse posterior bands; XVI (the last oesophageal segment) and succeeding intestinal segments with only anterior bands; bands dense in XIV–XVII.

Caudally, commencing at segment 120 (in holotype with 192 segments), with numerous enlarged nephridia (almost megameronephridia) in each segment on the anterior wall of the segment near to and encircling the intestine, the nephridia about five deep and each with a long-stalked conspicuous preseptal funnel, the nephridial ducts in each segment running medially as a common duct on each side to enter the wall of the intestine anteriorly in the segment on each side of the dorsal blood vessel, though some individual nephridial ducts reach the wall of the intestine independently in the vicinity of their nephridial bodies. Concentric with and external to the enlarged, enteronephric nephridia are parietal astomate, apparently exonephric, micromeronephridia in dense transverse bands. The number of enlarged nephridia decreases, and that of the micromeronephridia greatly increases, in the last twenty or so segments.

Holandric; sperm funnels iridescent in X and XI; testis-sacs absent; seminal vesicles large lobulated sacs in XI and XII; similar, smaller, structures on the anterior septum of X are of unknown function but cannot be seminal vesicles. Ovaries (webs of large oocytes) and funnels in XIII; ovisacs absent. Prostates limited to XVIII, flattened, lobulated S-shaped glands with short slightly tortuous muscular ducts joined near their ental ends by the vasa deferentia. Penial setae absent. Spermathecae 3 pairs, in VII, VIII and IX, diverticulum (inseminated) single, subspherical, internally multiloculate, with a short stalk (H, Pl).

Field Variation: In 16 clitellate type-specimens, including the holotype, a transverse median genital marking is present in 15/16 and 16/17 in 9 specimens, and in 19/20 in 10 specimens. Seven of these specimens have the full complement of markings, in 15/16, 16/17 and 19/20; 2 specimens have the genital marking in 15/16 only; 2 have them in 16/17 and 19/20 only; 1 has a marking in 19/20 only; and 4 have no markings.

Material Examined: Cudlee Creek, 34°50'S., 138°49'E., from below apple orchard of Mr. G. Newman, *Edmonds*, August 1971—*H*, *P1–9*; *N. Maier*, 21.viii.1972—*P13–15*. Hahndorf, 35°02'S., 138°48'E., *G. Peterson*, 25.viii.1972—*P10–12*.

H, *P2–4*, deposited in the Australian Museum, Sydney; P1, 5, British Museum (Natural History); P6, 7, South Australian Museum; P8–12 Jamieson collection.

Remarks: Material used in undergraduate studies and not retained cannot be designated type-material but, nevertheless, variation in it may be noted. In 50 specimens the length was 200–270 mm; the width was 7–9 mm generally but 8–11 mm in the region of crop and gizzard. The clitellum embraced XIV–XVII but sometimes included part of XIII and of XVIII. Numbers of spermathecal pores and location of the male pores and of the female pore were constant. Accessory genital markings, when present, were usually at 15/16, 16/17 and 19/20. The intestine usually began in XVIII, a condition also noted in some of the type-

specimens. The flattened S-shaped form of the prostates was constant. The supra-oesophageal vessel occupied VII–XIV, ramifying on the oesophagus at each end. In one hundred specimens the number of segments was 155–198.

The course of the suboesophageal blood vessels has not been unequivocally determined and, with that of the latero-parietals, requires further examination. The structures resembling seminal vesicles anteriorly in X do not show spermato-genesis in serial sections, whereas the seminal vesicles in XI and XII do.

Gemascolex newmani is distinguished from the equally large *Megascolex stirlingi*, so far as it is described by Fletcher, 1888, in (a) location of the spermathecal and male pores in *ab* lines whereas in *M. stirlingi* they are markedly more lateral, in setal lines 6 and between setal lines 3 and 4 respectively; (b) the unpaired instead of paired accessory genital markings and their forward extension to intersegment 15/16; (c) the S-shaped, not straight, prostates and in other respects.

Noteworthy differences from *M. zietzi*, as described by Michaelsen, 1907a, are (a) the more median location of spermathecal and male pores, (b) location of the male pores well lateral of paired accessory genital markings in *M zietzi*, (c) presence of further paired markings on the anterior border of the male porophores in the latter species; (d) restriction of the prostates to XVIII and their S-shaped form; (e) the subspherical sessile spermathecal diverticulum of *newmani* contrasted with the very long tortuous tubular diverticulum of *M. zietzi*.

Acknowledgements

The authors thank Mr. G. Newman for permitting collection of the new species from his property and Mr. G. Peterson and N. Maier for procuring additional material. This work was carried out during tenure of ARGC and URG grants.

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